

## 5. FOS Release A End-to-End Test Cases

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This portion of the document contains the FOS Release A end-to-end test case procedures, which verify most Release A Level 3 requirements that apply to the EOC (L3 requirements are also verified in the thread tests in Section 4). Emphasis is on broader requirements and capabilities rather than on individual threads.

The end-to-end procedures are executed from the perspective of the EOC operating as an integrated whole. They demonstrate that the EOC can accomplish its mission under typical operational conditions and perform multiple tasks and processes concurrently. Unlike the thread procedures, where relatively small pieces of functionality are verified individually, the end-to-end procedures verify larger portions of EOC functionality, including several concurrent processes and activities.

Applicable Flight Operations Team (FOT) and Instrument Operations Team (IOT) operator positions are identified in these procedures. Within a procedure, each operator position is assigned to a specific user station.

End to End Test Case procedures described in this section are as follows:

- INT 2000A    End-to-End Test #1 (Housekeeping Telemetry Processing; Activity Definition and Scheduling; PROC Building)**
- INT 2010A    End-to-End Test #2 (Health & Safety Telemetry Processing; DAS/ATC/Ground Schedule Generation; Analysis Request Processing)**
- INT 2020A    End-to-End Test #3 (Standby Telemetry Processing; Ground Script Execution; Table Load Generation)**

Since these tests are designed to verify concurrent functionality, pre-contact, contact, and post-contact activities are included in these tests.

<b>Test No.:</b>	INT 2000A
<b>Test Title:</b>	Housekeeping Telemetry Processing; Activity Definition and Scheduling; Command Procedure Building
<b>Test Configuration:</b>	See Appendix G
<b>Test Support:</b>	Startup scripts for Data Server, Real-Time Server, and User Stations  Default room definitions  Services and data.db files containing valid server and user station designations  PDB with valid command and telemetry mnemonic definitions  SYBASE server  Telemetry packet driver or ETS to transmit housekeeping telemetry data stream
<b>Test Positions:</b>	FOT Spacecraft Activity Controller (System Initialization)  FOT Spacecraft Evaluator (User Station #1)  IOT Instrument Evaluator (User Station #2)  FOT Planner/Scheduler (User Station #3)

#### **Test Description:**

This test procedure is designed to demonstrate the EOS Operations Center (EOC) capabilities in an operational manner, with multiple User Stations executing concurrent functionality. This is the first integrated test procedure in a series of three. This test procedure will demonstrate and verify functions of Planning and Scheduling, by defining defining and scheduling activities; Resource Management, by creating and viewing logical strings; and Telemetry, by capturing, processing and archiving simulated housekeeping telemetry data.

The test procedure begins with the startup of the EOC software. The telemetry driver is initiated, telemetry pages are displayed, and archiving is enabled. Preparation for the receipt and monitoring of telemetry data is performed. Planning and Scheduling functions are started as the flow of simulated real-time housekeeping telemetry data is initiated from the simulated EDOS telemetry driver. Once telemetry data transmission has begun, telemetry data ingest and processing continue throughout the entire execution of the test procedure. Finally, event message analysis is performed.

#### **Success Criteria:**

This test procedure is considered successful when all EOC hardware and software are initialized and when the EOC successfully accomplishes the following: creates logical strings, activity definitions, and schedules activities; receives simulated real-time housekeeping telemetry data;

decommutates telemetry data values and converts them to engineering units (EU), flags them for limits violations, and displays telemetry values.

### **Procedure Execution:**

The procedure steps for this test case are grouped into subprocedures. Each subprocedure details a function that is performed by an individual test position. To coordinate the events in this test case, the subprocedures are executed in phases. In each phase of this test, one or more subprocedure is executed concurrently with other subprocedures grouped in the same phase. For subprocedures that are executed independent of other subprocedures, such as system startup, a phase will have only one set of subprocedures. The subprocedures in this test case are grouped in the following phases:

- Phase 1:        System Startup Subprocedures
- Phase 2:        Build Telemetry Header Display Page Subprocedures (User Station #1)  
                  Build Housekeeping, Health & Safety, and Standby Telemetry Display Page Subprocedures (User Station #2)
- Phase 3:        FOT Monitor Housekeeping Telemetry Subprocedures (User Station #1)  
                  IOT Monitor Housekeeping Telemetry Subprocedures (User Station #2)  
                  Activity Definition Subprocedures (User Station #3)
- Phase 4:        FOT Monitor Housekeeping Telemetry Subprocedures (User Station #1)  
                  IOT Monitor Housekeeping Telemetry Subprocedures (User Station #2)  
                  Activity Scheduling Subprocedures (User Station #3)
- Phase 5:        FOT Monitor Housekeeping Telemetry Subprocedures (User Station #1)  
                  IOT Monitor Housekeeping Telemetry Subprocedures (User Station #2)  
                  Build Command PROC Subprocedures (User Station #3)

### **Procedures:**

#### **FOT Spacecraft Activity Controller -- System Startup Subprocedures:**

1. Log onto an EOC workstation, dedicated as **USER STATION #1**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest1**

Password: **\*\*\*\*\***

2. From a new Terminal window, rlogin to the Data Server, change the directory to /fos/test/am1/scripts/setup, and invoke the Data Server startup script.

%: **rlogin foseoc7 -l fostest1**

Password: \*\*\*\*\*

#: **cd /fos/test/am1/scripts/setup**

#: **source A2\_DataServerStartup**      (*wait for script completion*)

Note: Script is complete when the following message appears repeatedly in the Terminal window:

“Waiting for activity”

3. From a new Terminal window, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

#: **cd /fos/test/am1/scripts/setup**

#: **source A2\_UserStationStartup**      (*wait for script completion*)

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

4. Invoke the Event Display by entering the following in the ECL directive line of the Control Window.

ECL> **TOOL Event\_Display**

5. From a new Terminal window, rlogin to the Real Time Server, change the directory to /fos/test/am1/scripts/setup, and invoke the Real Time Server startup script.

#: **rlogin foseoc6 -l fostest1**

Password: \*\*\*\*\*

#: **cd /fos/test/am1/scripts/setup**

#: **source A2\_RealTimeServerStartup**      (*wait for script completion*)

Note: Script is complete when the following event message appears in the Events Display window on the User Station:

“String 100 was created.”

6. Log onto the EOC workstation, dedicated as **USER STATION #2**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest2**

Password: \*\*\*\*\*

7. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

#: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

8. Log onto the EOC workstation, dedicated as **USER STATION #3**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest3**

Password: **\*\*\*\*\***

9. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

## **FOT Spacecraft Evaluator -- Build Telemetry Header Display Page Subprocedures:**

### **USER STATION #1**

10. Invoke the Display Builder tool via ECL directive:

**ECL: TOOL Display\_Builder**

11. Generate a heading in the Display Builder Dynamic Page.

- a. In the Display Builder Palette, click on the “Label” box to create a highlighted label.
- b. Drag the highlighted label to an appropriate heading position in the Display Builder Dynamic Page, and release the mouse button to drop the highlighted label.
- c. In the Display Item Format window, edit the text field and replace “Label” with “Header”.
- d. Click “Apply” so that the Display Builder Dynamic Page contains the “Header” heading.

12. Generate place-holder fields for 16 parameters in the Display Builder Dynamic Page.

- a. In the Display Builder Palette, click the “Field” box to create a highlighted field.
- b. Drag the highlighted field to a position just below the last item in the Display Builder Dynamic Page, and release the mouse button to drop the highlighted field.
- c. Perform Substeps “a” and “b” 15 more times.

13. Define the parameter data source.

- a. In the Display Builder Palette, under Edit, select “Logical String Management”.
- b. In the Dynamic Page Data Sources window, select the following for Spacecraft, Source, Mode, and Connect Type, respectively: “AM1”, “Real Time”, “Operational”, and “Default”.
- c. Click “Add”.
- d. Select “AM1 RealTime Operational Default”.
- e. Click “OK”.

14. Select a parameter mnemonic and include it in the Display Builder Dynamic Page.

- a. Select the topmost line with “Unknown” in the Display Builder Dynamic Page.
- b. In the Display Item Data Sources window, click “Add”.
- c. In the Display Item Parameter Picker window, click “Filter”. If the applicable Selection Filter has already been selected, go to Substep “h”.
- d. In the Selection Filter window, select “AM1” for Spacecraft and “EDS” for Instrument.
- e. Click “Select”.
- f. Repeat the immediately preceding two steps twice. Replace “EDS” with “SYS” the first time; with “SDU” the second time.
- g. Click “OK”.
- h. In the Display Item Parameter Picker window, depress the Selection Filter radio button, if necessary, and select the appropriate parameter mnemonic from the Available Parameters list based on the parameter number.

Parameter Number	Selection Filter	Parameter Mnemonic
1	AM1_EDS	EDS_SCID
2	AM1_EDS	EDS_QUALITY
3	AM1_EDS	EDS_CCSDS_HDR_LENGTH
4	AM1_EDS	EDS_CYCLE_COUNT
5	AM1_EDS	EDS_ESH_LENGTH
6	AM1_EDS	EDS_ESH_VERSION
7	AM1_EDS	EDS_HEADER_FLAG
8	AM1_EDS	EDS_PCKT_LENGTH_ERR
9	AM1_EDS	EDS_SDU_TYPE
10	AM1_EDS	EDS_SEC_HDR_LENGTH
11	AM1_SYS	SYS_ACTIVE_STRING_ID
12	AM1_SYS	SYS_DATA_TYPE

Parameter Number	Selection Filter	Parameter Mnemonic
13	AM1_SYS	SYS_SC_ID
14	AM1_SYS	SYS_STRING_ID
15	AM1_SYS	SYS_USER_ID
16	AM1_SDU	SDU_SCTIME

- i. Click "-->". De-select (highlight and click "<--") all other displayed parameters, if any.
  - j. Click "OK".
15. Repeat the immediately preceding Substeps "a" through "j" for each remaining parameter.
16. Adjust, if necessary, the position of the heading and parameter rows in the Display Builder Dynamic Page by selecting each item and editing the appropriate characteristics in the Display Item Format window.
17. Save the telemetry header display page just built.
  - a. In the Display Builder Palette, under File, select "Save As".
  - b. In the Save As dialog box, set the directory to "/fos/test/am1/displaydefs/newpages", and enter "Header" for the filename.
  - c. Wait for a confirmation message that the display page has been saved.
  - d. Quit the Display Builder by entering "Quit" under File in the Display Builder Palette.
18. Bring down User Station #1.
19. After User Station #1 has been brought down, run **ProcessPms** so that the telemetry header display page just built will be the one that is called up after the next invocation of the User Station startup script.

## **FOT Spacecraft Evaluator -- Build Housekeeping, Health & Safety, and Standby Telemetry Display Page Subprocedures:**

### **USER STATION #2**

Note: Standby parameters must be manually entered into the data base prior to building a display page with standby parameters.

20. Invoke the Display Builder tool via ECL directive:

**ECL: TOOL Display\_Builder**

21. Generate a heading in the Display Builder Dynamic Page.
  - a. In the Display Builder Palette, click on the "Label" box to create a highlighted label.

- b. Drag the highlighted label to an appropriate heading position in the Display Builder Dynamic Page, and release the mouse button to drop the highlighted label.
  - c. In the Display Item Format window, edit the text field and replace “Label” with “Housekeeping”.
  - d. Click “Apply” so that the Display Builder Dynamic Page contains the “Housekeeping” heading.
22. Generate place-holder fields for five parameters in the Display Builder Dynamic Page.
- a. In the Display Builder Palette, click the “Field” box to create a highlighted field.
  - b. Drag the highlighted field to a position just below the last item in the Display Builder Dynamic Page, and release the mouse button to drop the highlighted field.
  - c. Perform Substeps “a” and “b” four more times.
23. Repeat the immediately preceding two steps twice. Replace “Housekeeping” with “Health & Safety” the first time; replace “Housekeeping” with “Standby” the second time.
24. Define the parameter data source.
- a. In the Display Builder Palette, under Edit, select “Logical String Management”.
  - b. In the Dynamic Page Data Sources window, select the following for Spacecraft, Source, Mode, and Connect Type, respectively: “AM1”, “Real Time”, “Operational”, and “Default”.
  - c. Click “Add”.
  - d. Select “AM1 RealTime Operational Default”.
  - e. Click “OK”.
25. Select a parameter mnemonic and include it in the Display Builder Dynamic Page.
- a. Select the topmost line with “Unknown” in the Display Builder Dynamic Page.
  - b. In the Display Item Data Sources window, click “Add”.
  - c. In the Display Item Parameter Picker window, click “Filter”. If the applicable Selection Filter has already been selected, go to Substep “g”.
  - d. In the Selection Filter window, select the applicable Spacecraft, Instrument, and Sample Type based on the applicable telemetry type and parameter number.

Telemetry Type	Parameter Number	Spacecraft	Instrument	Sample Type
Housekeeping	1	AM1	CDH	I
Housekeeping	2	AM1	CDH	I
Housekeeping	3	AM1	CDH	V



Telemetry Type	Parameter Number	Spacecraft	Instrument	Sample Type
Housekeeping	4	AM1	PMS	V
Housekeeping	5	AM1	TCS	V
Health & Safety	1	AM1	CDH	B
Health & Safety	2	AM1	CDH	B
Health & Safety	3	AM1	CDH	N
Health & Safety	4	AM1	COM	S
Health & Safety	5	AM1	PMS	T
Standby	1	AM1	CDH	B
Standby	2	AM1	CDH	B
Standby	3	AM1	CDH	B
Standby	4	AM1	CDH	B
Standby	5	AM1	CDH	B

- e. Click “Select”. De-select (highlight and click “Remove”) all other displayed Selection Filters, if any.
- f. Click “OK”.
- g. In the Display Item Parameter Picker window, depress the applicable Selection Filter radio button, if necessary, and select the parameter mnemonic from the Available Parameters list based on the telemetry type and parameter number.

Telemetry Type	Parameter Number	Selection Filter	Parameter Mnemonic
Housekeeping	1	AM1_CDH_I	CDH_IR_DAS_BDU_EPCA
Housekeeping	2	AM1_CDH_I	CDH_IR_DAS_BDU_EPCB
Housekeeping	3	AM1_CDH_V	CDH_VR_PWRB_A4T_2V
Housekeeping	4	AM1_PMS_V	PMS_VR_PMEA1_10V
Housekeeping	5	AM1_TCS_V	TCS_VR_FSS_H_HTRA
Health & Safety	1	AM1_CDH_B	CDH_BR_DCU1_BIT_RES
Health & Safety	2	AM1_CDH_B	CDH_BR_PNCODE_RCVD
Health & Safety	3	AM1_CDH_N	CDH_NR_ACT_NXT_FRSEQ
Health & Safety	4	AM1_COM_S	COM_SR_SBT2_WB_AGC
Health & Safety	5	AM1_PMS_T	PMS_TR_REA_2
Standby	1	AM1_CDH_B	CDH_BR_STBY_WD1
Standby	2	AM1_CDH_B	CDH_BR_STBY_WD2
Standby	3	AM1_CDH_B	CDH_BR_STBY_WD3
Standby	4	AM1_CDH_B	CDH_BR_STBY_WD4
Standby	5	AM1_CDH_B	CDH_BR_STBY_WD5

- h. Click “-->”. De-select (highlight and click “<--”) all other displayed parameters, if any.
- i. Click “OK”.

26. Repeat the immediately preceding Substeps “a” through “i” for each remaining telemetry type and parameter.
27. Adjust, if necessary, the position of the headings and parameter rows in the Display Builder Dynamic Page by selecting each item and editing the appropriate characteristics in the Display Item Format window.
28. Save the Housekeeping, Health & Safety, and Standby telemetry display page just built.
  - a. In the Display Builder Palette, under File, select “Save As”.
  - b. In the Save As dialog box, set the directory to “/fos/test/am1/displaydefs/newpages”, and enter “TLMDecom” for the filename.
  - c. Wait for a confirmation message that the display page has been saved.
  - d. Quit the Display Builder by entering “Quit” under File in the Display Builder Palette.
29. Bring down User Station #2.
30. After User Station #2 has been brought down, run **ProcessPMS** so that the housekeeping, health & safety, and standby telemetry display page just built will be the one that is called up after the next invocation of the User Station startup script.

## **FOT Spacecraft Evaluator -- FOT Monitor Housekeeping Telemetry Subprocedures:**

### **USER STATION #1**

Note: Since User Station #1 was brought down after the telemetry header display page was built, the user station startup script must be re-invoked.

31. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.  
  
    %: **cd /fos/test/am1/scripts/setup**  
  
    %: **source A2\_UserStationStartup**      *(wait for script completion)*
  - a. Invoke the Event Display from the Control Window tool menu.
32. Connect to a string, to accept housekeeping data, by entering the following in the ECL directive line of the Control window:  
  
    ECL> **STRING CONNECT STRING=100 TLMTYPE=ALL**  
    **CONFIG=MIRROR**
  - a. Wait for the event message “Successfully connected to string 100” to appear.
33. At the user station, bring up the “Header” alphanumeric page, which displays telemetry header field values, by entering the following:  
  
    ECL> **P Header**

- a. Verify the EDU\_header window appears at the user station and contains the following fields:
    - (1) Mnemonic descriptors
    - (2) Static flags for all descriptors
    - (3) NODATA flags for all descriptors
    - (4) Spacecraft time (SDU\_SCTIME)
    - (5) Data source (spacecraft ID) (EDS\_SCID)
    - (6) Quality indicator (EDS\_QUALITY)
    - (7) APID number (SDU\_PCKT\_APID)
    - (8) Packet sequence count (SDU\_PACKET\_SEQ)
34. At the user station, bring up the “TLMDecom” alphanumeric page, which displays housekeeping, health & safety, and standby mnemonic values, by entering the following:
- ECL> P TLMDecom**
- a. Verify the TLMDecom display appears at the user station and contains the following:
    - (1) Mnemonic descriptors
    - (2) Static flags for all descriptors
    - (3) NODATA flags for all descriptors
35. **NOTE: The IOT Instrument Evaluator must be ready to monitor telemetry before this step is executed.**

From a new Terminal window, invoke the simulated EDOS telemetry driver for the multicast of housekeeping telemetry packets for processing.

- a. In a console window, enter the following:

**%: cd /fos/test/am1/scripts/setup**

**%: source A2tlmEnvVars**

**%: cd /fos/test/am1/bin/sun\_sparc\_5-4**

**%: A2tlm**

Enter tlm type: **am1-hk**

At the A2tlm prompt enter the following:

IP address = **224.2.2.45**

Port number = **7711**

Number of packets to send: **-1** sends infinite number of packets

Generate sequence errors: **0**

Packet delay in milliseconds: **1000**

**Note the telemetry start time for the Analysis Request in test INT2010A**

36. Verify that each mnemonic's "NODATA" and "STATIC" flag indicators no longer appear on any of the display pages and that the mnemonics are marked as active (except for mnemonics that are not defined as housekeeping mnemonics).
37. Verify that mnemonics that are not defined as housekeeping mnemonics are still flagged as static and the NODATA indicator is still apparent.
38. **NOTE: Execute this step only after all subprocedures on all workstations for this test have been completed.**

Stop the telemetry driver by entering CTRL+C in the console window where the Telemetry driver is running.

**Note the telemetry stop time for the Analysis Request in test INT2010A.**

39. After the telemetry driver has been stopped, verify that each mnemonic's "NODATA" and "STATIC" flag indicators appear (within several minutes) at each alphanumeric telemetry display.

**IOT Instrument Evaluator -- IOT Monitor Housekeeping Telemetry Subprocedures:**

**USER STATION #2**

Note: Since User Station #2 was brought down after the housekeeping, health & safety, and standby telemetry display page was built, the user station startup script must be re-invoked.

40. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

- a. Invoke the Event Display from the Control window tool menu.

41. Connect to a string, to accept housekeeping data, by entering the following in the ECL directive line of the Control window:

**ECL> STRING CONNECT STRING=100 TLMTYPE=ALL  
CONFIG=MIRROR**

- a. Wait for the event message "Successfully connected to string 100" to appear.

42. At the user station, bring up the “Header” alphanumeric page, which displays telemetry header field values, by entering the following:

**ECL> P Header**

- a. Verify the EDU\_header window appears at the user station and contains the following fields:
  - (1) Mnemonic descriptors
  - (2) Static flags for all descriptors
  - (3) NODATA flags for all descriptors
  - (4) Spacecraft time (SDU\_SCTIME)
  - (5) Data source (spacecraft ID) (EDS\_SCID)
  - (6) Quality indicator (EDS\_QUALITY)
  - (7) APID number (SDU\_PCKT\_APID)
  - (8) Packet sequence count (SDU\_PACKET\_SEQ)

43. At the user station, bring up the “TLMDecom” alphanumeric page, which displays housekeeping, health & safety, and standby mnemonic values, by entering the following:

**ECL> P TLMDecom**

- a. Verify the TLMDecom display appears at the user station and contains the following:
    - (1) Mnemonic descriptors
    - (2) Static flags for all descriptors
    - (3) NODATA flags for all descriptors
44. Verify that each mnemonic’s “NODATA” and “STATIC” flag indicators no longer appear on any of the display pages and that the mnemonics are marked as active (except for mnemonics that are not defined as housekeeping mnemonics).
45. Verify that mnemonics that are not defined as housekeeping mnemonics are still flagged as static and the NODATA indicator is still apparent.
46. After the telemetry driver has been stopped on User Station #1, verify that each mnemonic’s “NODATA” and “STATIC” flag indicators appear (within several minutes) at each alphanumeric telemetry display.

## **FOT Planner/Scheduler -- Activity Definition Subprocedures:**

### **USER STATION #3**

47. Bring up the event display.

48. Verify that the Activity Definer Tool window is displayed.
49. Using the mouse, click on the Activity Definer **'File'** menu and select the **'New'** option to define a new activity. Verify the user receives a prompt to enter the name of the new activity and the resource that the activity is being defined against.
50. Enter the activity name **'intA2\_test'** and select the **'AM1 ASTER'** as the resource.

New Activity Name: **intA2\_test**

Resource Name: **AM1 ASTER** (*selectable from menu using mouse*)

Select **'OK'**

- a. Verify on the Activity Definer display window that the Activity Name updated with **'intA2\_test'** and the Resource Name updated with **'AM1 ASTER'**
51. Using the mouse, click on the Activity Definer **'Edit'** menu and select the **'Commands'** option to access available MODIS commands for incorporation into the **'intA2\_test'** activity.
    - a. Verify that a Command window is displayed at the user workstation that provides a list of available commands for incorporation. (Select **'ATC commands'** as opposed to the **'Ground commands'** button).
  52. Using the mouse, click on the ASTER ATC commands to be incorporated into the **intA2\_test** activity. Associate an off-set time with the commands. Select the following commands and times:

**AST\_TURN\_ON\_C\_TDP**

**START +00:01:00** (*Invoke 'Add' button*)

**AST\_TURN\_OFF\_C\_TDP**

**START +00:02:00** (*Invoke 'Add' button*)

*Select the APPLY Button*

53. Using the mouse, click on the ASTER Ground commands to be incorporated into the **intA2\_test** activity (Select **'Ground commands'** as opposed to **'ATC'** commands). Associate an off-set time with the commands. Select the following commands and times:

**AST\_TURN\_ON\_C\_TDP**

**START +00:03:00** (*Invoke 'Add' button*)

**AST\_TURN\_OFF\_C\_TDP**

**START +00:04:00** (*Invoke 'Add' button*)

*Select the APPLY Button*

- a. Insert a **"WAIT"** directive into the activity. Edit **"ECL directives"**, click **"add"** for the **WAIT** directive with a start time=**+00:01:30**, click **"apply to insert the directive"**, click **"OK"** when done.
54. From the Command window select the **'OK'** option and verify that the ASTER command is merged into the Activity Definer window under **'Items'**.
  55. From the Activity Definer window select the **'Activity Description'** box. Enter a description of the activity:

**"This activity will be scheduled, built in an ATC, and uplinked"**

56. From the Activity Definer 'Edit' menu, select the 'Scheduling Info' option. Verify that the Activity Scheduling Information window is displayed at the user workstation.

57. Select 'Start Time' and 'Stop Time' for the activity. Enter the start GMT time date yyyy/ddd and time hh:mm:ss. Enter the stop time date yyyy/ddd and time hh:mm:ss. Select 'Apply'.

START            1996/200            01:00:00

STOP            1996/200            03:00:00

- a. Invoke 'Apply' and verify the start and stop times are accepted.
- b. Select 'OK' to apply the scheduling information to the activity.
- c. From the Activity Definer 'File' menu, select the 'Save' option to save intA2\_test as an AM1 ASTER Activity.
- d. From the Activity Definer 'File' menu, select the 'Close' option to close the intA2\_test activity.

### **FOT Planner/Scheduler -- Activity Scheduling Subprocedures:**

#### **USER STATION #3**

58. From the General Scheduler window, change the resource to schedule against **AM1 ASTER**.

59. From the General Scheduler 'Filter' menu select the 'Activities' option to display the activities available for scheduling against the AM1 ASTER resource.

- a. Verify that activity 'intA2\_test' is available for scheduling.
- b. Select the Master Plan as the plan that the activities are to be scheduled against.

60. Select the 'intA2\_test' activity for scheduling against the Master Plan.

61. From the General Scheduler 'Action' menu select 'Impact' option so that scheduling of intA2\_test impacts the Master Plan.

62. Select 'Start Time' and 'Stop Time' as the options for scheduling the activity.

- a. Enter a Start Time of 1996/163 02:00:00. Enter a Stop Time of 1996/163 03:00:00.

63. From the General Scheduler 'Action' menu select the 'Schedule' option to schedule the activity fosA2\_test. Select the master plan as the plan to schedule against.

- a. Verify that the activity appears on the Timeline master plan under the resource, dates and times selected using the General Scheduler.
- b. Select "Open" from the EOS timeline file pull-down menu.
- c. Select the master plan.

- d. Select start time **1996/163 00:00:00**
- e. Select Stop time **1996/163 08:00:00**
- f. Select Resources from the User Setup pull-down menu. Click AM1-ASTER, click “ADD”, click “OK”.

## **FOT Planner/Scheduler -- Build Command PROC Subprocedures:**

### **USER STATION #3**

Build a command procedure to be merged into the ground script during execution.

64. Activate the Procedure Builder.

- a. Enter the following directive from the control window.

**ECL> TOOL Procedure\_Builder**

- b. Verify the Procedure Builder window display. This window will contain the following:
  - (1) A menu bar with four pull down menus; File, Edit, Tools, and Help
  - (2) An Identification line with the Procedure File Name and Procedure Type
  - (3) A scrolling text area
  - (4) A status message line
  - (5) A Go To text input field
  - (6) Two status indication buttons and text fields, Validate and Check Syntax

65. Open a new file.

- a. Select the File pull down menu.
- b. Select the New option to open a template file.
- c. Verify the blank template.

66. Delete the following by using the cursor to high light the text and pressing the delete key:

```
#  
#  INSERT ECL DIRECTIVES HERE  
#
```

*(The cursor should be flashing on a blank line within the scrolling text area.)*

67. Insert a directive keyword into the scrolling text area.

- a. Select the Tool pull down menu.



- b. Select the Directive Builder option.
- c. Verify the Directive Builder window display. This window will contain the following:
  - (1) An ECL text field
  - (2) Directive keywords text field and list box
  - (3) Subsystems list box with Filter button and selection buttons; All and None
  - (4) Cmds (Commands) and Tlms (Telemetry) selection buttons, text field and list box.
  - (5) Selection Template list box
  - (6) Status message line
  - (7) Control button selections; OK, Apply, Cancel, and Help
- d. Use the mouse pointer and select the Cmds button.
- e. Single click on the Filter button under the Subsystem list box.
- f. Verify that spacecraft and instrument names are in the Subsystem list box.
- g. Filter on the following:
 

AM1\_AST
- h. Click on Select and then OK.
- i. Verify the Filter window closing and the filter selection appears in the filter box within the Directive Builder window.
- j. Click the toggle button for AM1\_AST.
- k. Verify that the Cmds/Tlms list box contains command directives.
- l. Single click on the following command directive.
 

AST\_TURN\_ON\_C\_SDP
- m. Verify that the qualifiers of the directive appear in the Selection Template list box.
- n. Double click on AST\_TURN\_ON\_C\_SDP in the Cmds/Tlms list box.
- o. Verify that the directive is inserted into the ECL text field. Click 'Apply'.
- p. Repeat the immediately preceding Substeps "a" through "o" to insert the command:
 

AST\_TURN\_OFF\_C\_SDP.
- q. Select 'save as' from the 'file' menu. Click on 'System Dir.'. Save the PROC as:
 

**/fos/test/am1/procs/INT\_PROC1**

- r. Invoke the 'OK' button.
- 68. Invoke the Check Syntax control button.
  - a. Verify the status as PASS (Green) in the syntax text field.
  - b. Verify the following statement on the status message line.

Syntax Verified.
- 69. Edit 'PROC xxxx()' and 'END PROC xxxx' with the following respectively:

PROC INT\_PROC1()  
END PROC INT\_PROC1
- 70. Invoke the Check Syntax control button.
  - a. Verify the status as PASS (Green) in the syntax text field.
  - b. Verify the following statement on the status message line.

Syntax Verified.
- 71. Select the Procedure Type.
  - a. Invoke the Procedure Type button and select the Command option.
  - b. Verify that Command is inserted as the Procedure Type.
- 72. Save the file.
  - a. Select the 'File' pull down menu.
  - b. Select the 'Save' option.
  - c. Invoke the 'OK' button.
  - d. Verify that the selection window closes.
- 73. Exit Procedure Builder from the File pull down menu by selecting Quit.

**Test No.:** INT 2010A

**Test Title:** Health & Safety Telemetry Processing; DAS/ATC/Ground Schedule Generation; Analysis Request Processing

**Test Configuration:** See Appendix G

**Test Support:** Startup scripts for Data server, Real-Time server, and User Stations  
 Default room definitions  
 Services and data.db files containing valid server and user station designations  
 PDB with valid command and telemetry mnemonic definitions  
 SYBASE server  
 Telemetry packet driver or ETS to transmit Health & Safety telemetry data stream  
 “Header” and “TLMDecom” Telemetry Displays built in test INT2000A  
 Activities scheduled in test INT2000A  
 Archived telemetry from test INT2000A

**Test Positions:** FOT Spacecraft Activity Controller (System Initialization)  
 FOT Spacecraft Evaluator (User Station #1)  
 FOT Planner/Scheduler (User Station #2)  
 FOT Spacecraft Evaluator (User Station #3)

**Test Description:**

This test procedure builds upon Integrated Test Procedure 1 and executes several FOS capabilities concurrently to simulate the operational environment. The test procedure verifies and demonstrates functions of Planning and Scheduling, by generating a Detailed Activity Schedule (DAS); Command Management, by generating a Ground Script from the DAS; and generation of an Absolute Time Commands (ATC) load; Telemetry, by capturing, processing and archiving emulated health and safety telemetry data; Analysis, by performing analysis on archived data captured in Integrated Test Procedure 1, building analysis datasets, and analyzing the event message log.

The test procedure begins with the creation and viewing of logical strings. The telemetry driver is initiated, telemetry pages are displayed, and archiving is enabled. Preparation for the receipt and monitoring of telemetry data is performed. Planning and Scheduling functions are started as the flow of simulated real-time health and safety telemetry data from the simulated EDOS telemetry driver is initiated. Once telemetry data transmission has begun, telemetry data ingest and processing continue throughout the entire execution of the test procedure. Event message

verification is then performed along with the submission of an analysis request for the housekeeping data archived in Integrated Test Procedure 1.

### **Success Criteria:**

This test procedure is considered successful when the EOC successfully accomplishes the following: creates logical strings; receives and archives simulated real-time health and safety telemetry data; constructs telemetry parameters, converts them to engineering units (EU), flags them for limits violations, and displays telemetry values; processes and completes an analysis request of archived housekeeping data including building an analysis dataset and analyzing event messages; generates a DAS, ATC load, and integrated load report; displays mission timeline and instrument resources.

### **Procedure Execution:**

The procedure steps for this test case are grouped into subprocedures. Each subprocedure details a function that is performed by an individual test position. To coordinate the events in this test case, the subprocedures are executed in phases. In each phase of this test, one or more subprocedure is executed concurrently with other subprocedures grouped in the same phase. For subprocedures that are executed independent of other subprocedures, such as system startup, a phase will have only one set of subprocedures. The subprocedures in this test case are grouped in the following phases:

- Phase 1:       System Startup Subprocedures
- Phase 2:       FOT Monitor Health & Safety Telemetry Subprocedures (User Station #1)  
                  DAS / ATC / Ground Schedule Generation Subprocedures (User Station #2)  
                  Analysis Request Subprocedures (User Station #3)
- Phase 3:       FOT Monitor Health & Safety Telemetry Subprocedures (User Station #1)  
                  Build Standby Telemetry Displays Subprocedures (User Station #1)

### **Procedures:**

#### **FOT Spacecraft Activity Controller -- System Startup Subprocedures:**

1. Log onto an EOC workstation, dedicated as **USER STATION #1**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest1**

Password: **\*\*\*\*\***

2. From a new Terminal window, rlogin to the Data Server, change the directory to /fos/test/am1/scripts/setup, and invoke the Data Server startup script.

?: **rlogin foseoc7 -l fostest1**

Password: **\*\*\*\*\***

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_DataServerStartup**      *(wait for script completion)*

Note: Script is complete when the following message appears repeatedly in the Terminal window:

“Waiting for activity”

3. From a new Terminal window, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

4. Invoke the Event Display by entering the following in the ECL directive line of the Control Window.

ECL> **TOOL Event\_Display**

5. From a new Terminal window, rlogin to the Real Time Server, change the directory to /fos/test/am1/scripts/setup, and invoke the Real Time Server startup script.

%: **rlogin foseoc6 -l fostest1**

Password: \*\*\*\*\*

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_RealTimeServerStartup** *(wait for script completion)*

Note: Script is complete when the following event message appears in the Events Display window on the User Station:

“String 100 was created.”

6. Log onto the EOC workstation, dedicated as **USER STATION #2**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest2**

Password: \*\*\*\*\*

7. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

8. Log onto the EOC workstation, dedicated as **USER STATION #3**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest3**

Password: **\*\*\*\*\***

9. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

## **FOT Spacecraft Evaluator -- FOT Monitor Health & Safety Telemetry Subprocedures:**

### **USER STATION #1**

10. Connect to a string, to accept health & safety data, by entering the following in the ECL directive line of the Control window:

**ECL> STRING CONNECT STRING=100 TLMTYPE=ALL  
CONFIG=MIRROR**

- a. Wait for the event message “Successfully connected to string 100” to appear.

11. At the user station, bring up the “Header” alphanumeric page, which displays telemetry header field values, by entering the following:

**ECL> P Header**

- a. Verify the EDU\_header window appears at the user station and contains the following fields:
  - (1) Mnemonic descriptors
  - (2) Static flags for all descriptors
  - (3) NODATA flags for all descriptors
  - (4) Spacecraft time (SDU\_SCTIME)
  - (5) Data source (spacecraft ID) (EDS\_SCID)
  - (6) Quality indicator (EDS\_QUALITY)

- (7) APID number (SDU\_PCKT\_APID)
  - (8) Packet sequence count (SDU\_PACKET\_SEQ)
12. At the user station, bring up the “TLMDecom” alphanumeric page, which displays housekeeping, health & safety, and standby mnemonic values, by entering the following:
- ECL> P TLMDecom**
- a. Verify the TLMDecom display appears at the user station and contains the following:
    - (1) Mnemonic descriptors
    - (2) Static flags for all descriptors
    - (3) NODATA flags for all descriptors
13. From a new Terminal window, invoke the simulated EDOS telemetry driver for the multicast of health & safety telemetry packets for processing.
- a. In a console window, enter the following:
    - ?: **cd /fos/test/am1/scripts/setup**
    - ?: **source A2tlmEnvVars**
    - ?: **cd /fos/test/am1/bin/sun\_sparc\_5-4**
    - ?: **A2tlm**
    - Enter tlm type: **am1-hs**
    - At the A2tlm prompt enter the following:
      - IP address = **224.2.2.45**
      - Port number = **7721**
      - Number of packets to send: **-1** sends infinite number of packets
      - Generate sequence errors: **0**
      - Packet delay in milliseconds: **2000**
14. Verify that each mnemonic’s “NODATA” and “STATIC” flag indicators no longer appear on any of the display pages and that the mnemonics are marked as active (except for mnemonics that are not defined as health & safety mnemonics).
15. Verify that mnemonics that are not defined as health & safety mnemonics are still flagged as static and the NODATA indicator is still apparent.
16. NOTE: **Execute this step only after all subprocedures on all workstations for this test have been completed.**

Stop the telemetry driver by entering CTRL+C in the console window where the Telemetry driver is running.

17. After the telemetry driver has been stopped, verify that each mnemonic's "NODATA" and "STATIC" flag indicators appear (within several minutes) at each alphanumeric telemetry display.

## **FOT Planner/Scheduler -- DAS / ATC / Ground Schedule Generation Subprocedures:**

### **USER STATION #2**

18. From the Load Generator display, select DAS start and stop times **TBD** corresponding to a period on the timeline that includes scheduled activity 'intA2\_test' (scheduled in test INT 2000A).

#### **Note Start and Stop Times**

19. Set the uplink start and stop times to be prior to the start of the DAS.
  - a. Set the DAS ID to equal the day-of-year for the DAS generation.
20. Select the 'OK' push button to add the DAS product to the load queue and to send a ATC load generation request to the CMS Schedule Controller.
  - a. Verify that the 'Generate' request invokes the transfer of the DAS to CMS for expansion and ATC load generation. The user should receive a 'processing' status. (On the DataServer)
21. At the completion of the DAS expansion and ATC load generation, verify that the user receives a 'load complete' event message from CMS and 'completed' status from PAS. (On the DataServer)
22. Verify event messages are output from DMS FileMetaData process confirming the storage of the ATC load contents, load image, load uplink and load report.
  - a. Verify via the DMS FileMetaData process that the ATC load contents load image, load uplink and load report have been generated and stored. The files are stored in the following directories:

/fos/test/am1/loads (for .img and .upl files)

/...../reports (for the .rpt file)

## **FOT Spacecraft Evaluator -- Analysis Request Subprocedures:**

### **USER STATION #3**

23. Begin a historical data request.
  - a. Invoke the Analysis Request window.
  - b. Click the mouse on the 'Tools' button.



- c. Verify that the Tools Dialog window and a list of tools is displayed to the user.
  - d. Click the mouse on 'Analysis\_Request\_Builder'.
  - e. Click the mouse on the 'OK' button.
24. Enter into the Request Name field:
- > Int\_Request\_1**
25. Click the mouse on the 'EOC Only' icon to select data to be processed in the EOC.
26. Click the mouse on the 'All Data' button in the Data Quality box.
27. Invoke the Analysis Telemetry Selector window.
28. Click the mouse on the 'Select Telemetry...' button.
29. Use the selection filter to display a list a possible parameters to be used in the analysis request.
- a. Click the mouse on the 'Filter...' button. Click 'AM1' in the spacecraft area.
  - b. Click the mouse on 'CDH' in the Instrument text area.
  - c. Click the mouse on 'B' in the Sample Type text area.
  - d. Click the mouse on the 'Select' button.
  - e. Verify that CDH\_B is in the Selected text area.
  - f. Click the mouse on the 'OK' button.
30. Select Housekeeping telemetry points to be included in the analysis along with a sampling rates. This includes multi-byte parameters.
- a. Click 'AM1\_CDH\_B in the subsystems field.  
Click the mouse button on CDH\_BR\_DCU1\_BIT\_RES.
  - b. Select a sampling rate. Click the mouse on the 'All Data' icon.
  - c. Click the mouse button on the 'Select' button.
  - d. Click the mouse button on CDH\_BR\_PNCODE\_RCVD.
  - e. Select a sampling rate. Click the mouse on the 'All Data' icon.
  - f. Click the mouse button on the 'Select' button.
  - g. Click the mouse on the 'OK' button.
31. Invoke the Time Selector window.
- a. Click the mouse on the 'Select Time...' button.

- b. Verify that the Pair Time Selector window is displayed. This window includes the following fields and user interface menus:

Type of pair time (Absolute or Relative)

Start/stop key (Time or Event)

Specify selection (End Time, End Event, or Duration)

- 32. Enter the start and stop times to be used for a user-supplied statistics generation. Use the times noted in the **Test INT 2000A** for telemetry processing.

- a. Click the mouse on the 'Absolute' icon.
- b. Click the mouse on the 'Time' icon.
- c. Click the mouse on the 'Specify End Time' icon.
- d. Enter into the start date field:

> **1996/DDD** **press ENTER**

- e. Enter into the start time field:

> **HH:MM:SS.mmm** **press ENTER**

- f. Enter into the stop date field:

> **1996/DDD** **press ENTER**

- g. Enter into the stop time field:

> **HH:MM:SS.mmm** **press ENTER**

- h. Click the mouse on the 'OK' button.

- 33. Enter the following in the output DataSet field:

> **/fos/test/am1/datasets/Int\_Request\_1**

- 34. Save the analysis request.

- a. Click the mouse on the File pull down menu.
- b. Verify that a list of options appears. These options include new, open, save, save as, delete, and quit.
- c. Click the mouse on 'Save as...'.
- d. Verify that a File Selection window is displayed with a default directory path in the save as field.
- e. Enter the following at the end of the directory path (/fos/test/am1/data/FUI/requests/):

> **Int\_Request\_1**

- f. Click the mouse on the 'OK' button.
35. Generate a dataset for the given options selected.
- a. Click the mouse on the 'OK' button in the Analysis Request window.
36. Print out an ASCII report of the generated dataset.
- a. Invoke a terminal window at the user workstation and enter the following:
    - %: **cd /fos/test/am1/scripts/setup**
    - %: **setenv SCRIPT UserStation**
    - %: **source FosEnvVars**
    - %: **cd /fos/test/am1/bin/Sun\_Sparc\_5-4**
    - %: **FaDrReaderDriver**
  - b. Enter the following at the file name prompt:
    - > **/fos/test/am1/datasets/Int\_Request\_1**
  - c. Click the mouse on the 'Create Carryout file' button.
  - d. Enter the following in a terminal window:
    - %: **lp Int\_Request\_1.out**
37. Verify that the format of the carryout file agrees with the ECS-SAS ICD and that the contents of the carryout file are consistent with the telemetry data archived in the **Telemetry Processing** subprocedure.

## **FOT Spacecraft Evaluator -- Build Standby Telemetry Display Subprocedures:**

### **USER STATION #1**

Note: Standby parameters must be manually entered into the data base prior to building a display page with standby parameters.

38. Invoke the Display Builder tool via ECL directive:
- ECL: **TOOL Display\_Builder**
39. Generate a heading in the Display Builder Dynamic Page.
- a. In the Display Builder Palette, click on the "Label" box to create a highlighted label.
  - b. Drag the highlighted label to an appropriate heading position in the Display Builder Dynamic Page, and release the mouse button to drop the highlighted label.
  - c. In the Display Item Format window, edit the text field and replace "Label" with "Standby".

- d. Click “Apply” so that the Display Builder Dynamic Page contains the “Standby” heading.
40. Generate place-holder fields for five parameters in the Display Builder Dynamic Page.
    - a. In the Display Builder Palette, click the “Field” box to create a highlighted field.
    - b. Drag the highlighted field to a position just below the last item in the Display Builder Dynamic Page, and release the mouse button to drop the highlighted field.
    - c. Perform Substeps “a” and “b” four more times.
  41. Define the parameter data source.
    - a. In the Display Builder Palette, under Edit, select “Logical String Management”.
    - b. In the Dynamic Page Data Sources window, select the following for Spacecraft, Source, Mode, and Connect Type, respectively: “AM1”, “Real Time”, “Operational”, and “Default”.
    - c. Click “Add”.
    - d. Select “AM1 RealTime Operational Default”.
    - e. Click “OK”.
  42. Select a parameter mnemonic and include it in the Display Builder Dynamic Page.
    - a. Select the topmost line with “Unknown” in the Display Builder Dynamic Page.
    - b. In the Display Item Data Sources window, click “Add”.
    - c. In the Display Item Parameter Picker window, click “Filter”. If the applicable Selection Filter has already been selected, go to Substep “g”.
    - d. In the Selection Filter window, select the following for Spacecraft, Instrument, and Sample Type, respectively: “AM1”, “CDH”, “B”.
    - e. Click “Select”.
    - f. Click “OK”.
    - g. In the Display Item Parameter Picker window, depress the “AM1\_CDH\_B” Selection Filter radio button, if necessary, and select the appropriate parameter mnemonic from the Available Parameters list based on the parameter number.

Parameter Number	Parameter Mnemonic
1	CDH_BR_STBY_WD1
2	CDH_BR_STBY_WD2
3	CDH_BR_STBY_WD3
4	CDH_BR_STBY_WD4
5	CDH_BR_STBY_WD5

- h. Click "-->". De-select (highlight and click "<--") all other displayed parameters, if any.
  - i. Click "OK".
43. Repeat the immediately preceding Substeps "a" through "i" for each remaining parameter.
44. Adjust, if necessary, the position of the heading and parameter rows in the Display Builder Dynamic Page by selecting each item and editing the appropriate characteristics in the Display Item Format window.
45. Save the standby telemetry display page just built.
- a. In the Display Builder Palette, under File, select "Save As".
  - b. In the Save As dialog box, set the directory to "/fos/test/am1/displaydefs/newpages", and enter "STBYonly" for the filename.
  - c. Wait for a confirmation message that the display page has been saved.
  - d. Quit the Display Builder by entering "Quit" under File in the Display Builder Palette.
46. Bring down User Station #1, but only after the telemetry driver invoked in the Monitor Health & Safety Telemetry Subprocedures has stopped.
47. After User Station #1 has been brought down, run **ProcessPms** so that the standby telemetry display page just built will be the one that is called up after the next invocation of the User Station startup script.

**Test No.:** INT 2020A

**Test Title:** Standby Telemetry Processing; Ground Script Execution; Table Load Generation

**Test Configuration:** See Appendix G

**Test Support:** Startup scripts for Data server, Real-Time server, and User Stations  
 Default room definitions  
 Services and data.db files containing valid server and user station designations  
 PDB with valid command and telemetry mnemonic definitions  
 SYBASE server  
 Telemetry packet driver or ETS to transmit Standby telemetry data stream  
 PROC built in test INT2000A  
 Ground Script generated in test INT2010A  
 “Header” and “TLMDecom” Telemetry Displays built in test INT2000A  
 “STBYonly” Telemetry Display built in test INT2010A  
 Table Definition

**Test Positions:** FOT Spacecraft Activity Controller (System Initialization)  
 FOT Spacecraft Evaluator (User Station #1)  
 FOT Spacecraft Activity Controller (User Station #2)  
 FOT Planner/Scheduler (User Station #3)

**Test Description:**

This test procedure builds upon Integrated Test Procedures 1 and 2 and accomplishes several FOS activities concurrently to simulate the operational environment. The test procedure verifies and demonstrates functions of Planning and Scheduling, by creating a Table Load; Commanding, by acquiring user authority for commanding, merging individual commands with the ground script, generating and validating contingency instrument commands, and preparing and transmitting real-time commands; Telemetry, by processing and archiving simulated standby data.

The test procedure begins with the creation and viewing of logical strings. The telemetry driver is initiated, telemetry pages are displayed, and archiving is enabled. Preparation for the receipt and monitoring of telemetry data is performed. Planning and Scheduling functions are started as the flow of simulated real-time standby data from the simulated EDOS telemetry driver is

initiated. Once telemetry data transmission has begun, telemetry data ingest and processing continue throughout the entire execution of the test procedure.

The next functions to be performed are the execution of the ground script and the ATC load transmission to the simulated EDOS. Real-time commands and command groups are generated, validated, merged with the ground script, and then transmitted to the simulated EDOS.

### **Success Criteria:**

The test procedure is considered successful when the EOC successfully accomplishes the following: creates logical strings; receives and archives simulated real-time standby telemetry data; constructs telemetry parameters, converts them to engineering units (EU), flags them for limits violations, and displays telemetry values; authorizes command authority; views the ground script and executes it in auto mode; transmits ATC load to the simulated EDOS; generates and validates real-time commands and contingency command groups, merges them with the ground script, and transmits them to the simulated EDOS.

### **Procedure Execution:**

The procedure steps for this test case are grouped into subprocedures. Each subprocedure details a function that is performed by an individual test position. To coordinate the events in this test case, the subprocedures are executed in phases. In each phase of this test, one or more subprocedure is executed concurrently with other subprocedures grouped in the same phase. For subprocedures that are executed independent of other subprocedures, such as system startup, a phase will have only one set of subprocedures. The subprocedures in this test case are grouped in the following phases:

Phase 1:        System Startup Subprocedures

Phase 2:        FOT Monitor Standby Telemetry Subprocedures (User Station #1)

                  Ground Script Execution Subprocedures (with Manual Real-Time Commanding and PROC Merging) (User Station #2)

                  Table Load Generation Subprocedures (User Station #3)

Phase 3:        FOT Monitor Standby Telemetry Subprocedures (User Station #1)

                  Ground Script Execution Subprocedures (with Manual Real-Time Commanding and PROC Merging) (User Station #2)

Phase 4:        FOT Monitor Standby Telemetry Subprocedures (User Station #1)

                  Ground Script Execution Subprocedures (with Manual Real-Time Commanding and PROC Merging) (User Station #2)

## Procedures:

### FOT Spacecraft Activity Controller -- System Startup Subprocedures:

1. Log onto an EOC workstation, dedicated as **USER STATION #1**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest1**

Password: **\*\*\*\*\***

2. From a new Terminal window, rlogin to the Data Server, change the directory to /fos/test/am1/scripts/setup, and invoke the Data Server startup script.

?: **rlogin fosseoc7 -l fostest1**

Password: **\*\*\*\*\***

?: **cd /fos/test/am1/scripts/setup**

?: **source A2\_DataServerStartup**      *(wait for script completion)*

Note: Script is complete when the following message appears repeatedly in the Terminal window:

“Waiting for activity”

3. From a new Terminal window, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

?: **cd /fos/test/am1/scripts/setup**

?: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

4. Invoke the Event Display by entering the following in the ECL directive line of the Control Window.

ECL> **TOOL Event\_Display**

5. From a new Terminal window, rlogin to the Real Time Server, change the directory to /fos/test/am1/scripts/setup, and invoke the Real Time Server startup script.

?: **rlogin fosseoc6 -l fostest1**

Password: **\*\*\*\*\***

?: **cd /fos/test/am1/scripts/setup**

?: **source A2\_RealTimeServerStartup** *(wait for script completion)*



Note: Script is complete when the following event message appears in the Events Display window on the User Station:

“String 100 was created.”

6. Log onto the EOC workstation, dedicated as **USER STATION #2**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest2**

Password: **\*\*\*\*\***

7. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

8. Log onto the EOC workstation, dedicated as **USER STATION #3**, under one of the fostest accounts (fostest1, fostest2, fostest3, fostest4):

Username: **fostest3**

Password: **\*\*\*\*\***

9. At the UNIX prompt, change directory to /fos/test/am1/scripts/setup. Invoke the User Station startup script.

%: **cd /fos/test/am1/scripts/setup**

%: **source A2\_UserStationStartup**      *(wait for script completion)*

Note: Script is complete when five Planning and Scheduling windows, the Load Manager window, and the Control Window are displayed. Iconify the Planning and Scheduling and Load Manager windows.

## **FOT Spacecraft Evaluator -- FOT Monitor Standby Telemetry Subprocedures:**

### **USER STATION #1**

10. Connect to a string, to accept standby telemetry data, by entering the following in the ECL directive line of the Control window:

**ECL> STRING CONNECT STRING=100 TLMTYPE=ALL  
CONFIG=MIRROR**

- a. Wait for the event message “Successfully connected to string 100” to appear.

11. At the user station, bring up the “Header” alphanumeric page, which displays telemetry header field values, by entering the following:

**ECL> P Header**

- a. Verify the EDU\_header window appears at the user station and contains the following fields:
  - (1) Mnemonic descriptors
  - (2) Static flags for all descriptors
  - (3) NODATA flags for all descriptors
  - (4) Spacecraft time (SDU\_SCTIME)
  - (5) Data source (spacecraft ID) (EDS\_SCID)
  - (6) Quality indicator (EDS\_QUALITY)
  - (7) APID number (SDU\_PCKT\_APID)
  - (8) Packet sequence count (SDU\_PACKET\_SEQ)

12. At the user station, bring up the “TLMDecom” alphanumeric page, which displays housekeeping, health & safety, and standby mnemonic values, and the “STBYonly” alphanumeric page, which displays standby mnemonic values, by entering the following:

**ECL> P TLMDecom**

**ECL> P STBYonly**

- a. Verify the displays appear at the user station and contain the following:
  - (1) Mnemonic descriptors
  - (2) Static flags for all descriptors
  - (3) NODATA flags for all descriptors

13. From a new Terminal window, invoke the simulated EDOS telemetry driver for the multicast of standby telemetry packets for processing.

- a. In a console window, enter the following:

**%: cd /fos/test/am1/scripts/setup**

**%: source A2tlmEnvVars**

**%: cd /fos/test/am1/bin/sun\_sparc\_5-4**

**%: A2tlm**

**Enter tlm type: am1-standby**

At the A2tlm prompt enter the following:

IP address = **224.2.2.45**

Port number = **7731**

Number of packets to send: **-1** sends infinite number of packets

Generate sequence errors: **0**

Packet delay in milliseconds: **2000**

14. Verify that each mnemonic's "NODATA" and "STATIC" flag indicators no longer appear on any of the display pages and that the mnemonics are marked as active (except for mnemonics that are not defined as standby mnemonics).
15. Verify that mnemonics that are not defined as standby mnemonics are still flagged as static and the NODATA indicator is still apparent.
16. NOTE: **Execute this step only after all subprocedures on all workstations for this test have been completed.**  
  
Stop the telemetry driver by entering CTRL+C in the console window where the Telemetry driver is running.
17. After the telemetry driver has been stopped, verify that each mnemonic's "NODATA" and "STATIC" flag indicators appear (within several minutes) at each alphanumeric telemetry display.

## **FOT Spacecraft Activity Controller -- Ground Script Execution Subprocedures:**

### **USER STATION #2**

18. Assign CAC privilege.
  - a. If not already connected to a string, connect by entering the following:  
**ECL> STRING CONNECT STRING=100 TLMTYPE=ALL CONFIG=MIRROR**
  - b. Wait for the event message "Successfully connected to string 100" to appear.
  - c. Enter the following directive from the control window.  
**ECL> TAKE COMMAND STRING=100**
  - d. Verify message via event display indicating command privileges have been assigned to the proper userid and workstation ID.
19. Activate Command Control window using the following tool directive from the control window.

**ECL> TOOL Command\_Control**

- a. A dialog box will appear allowing user to enter String id=100 and Spacecraft ID=AM1.
  - b. Verify Command Control window is displayed will all five user interface (pull down) menus; File, Edit, Config, Utility, and Help.
20. Select a ground script for execution. Bring up the time selector box **and enter times used to generate the DAS:**
  - a. Using the "File" menu from Command Control window select "Open".
  - b. Enter the DAS start time of the ground script selected for execution.  

**> YYYY/DDD HH:MM:SS.mmm**
  - c. Enter the DAS stop time of the ground script selected for execution.  

**> YYYY/DDD HH:MM:SS.mmm**

Click 'OK'
  - d. The contents of the ground script will be displayed in the text area of the Command Control window.
  - e. Verify the following items are properly displayed in the Command Control window (resize the Command Control window to view the command status field)

ground script start time

ground script stop time

spacecraft id associated with ground script

ground script status - suspended (default)

ground script processing mode - auto (default)

current bias time

verification flags (Prerequisite State Check (PSC)=OFF, Command (CV)=OFF, and Telemetry (TV)=OFF) (turn off if necessary using the Config pull-down menu)
  - f. Examine the ground script to ensure the commands/directives displayed represent the time period specified.
  - g. Place Command Control in the auto mode using the Config pull-down menu.
21. Insert a Real-Time Command
  - a. Click on '%AST\_TURN\_OFF\_C\_TDP' to highlight.
  - b. Type '**AST\_TURN\_OFF\_C\_SDP**' in the CMD: area of the command control window.

- c. Press enter
- d. Verify the Real-Time command was inserted above '%AST\_TURN\_OFF\_C\_TDP'.

22. Insert a Command PROC.

- a. Click on '/AST\_TURN\_ON\_C\_TDP' to highlight.
- b. Type '**START INT\_PROC1**' in the CMD: area of the command control window.
- c. Press enter
- d. Verify the PROC command was inserted above '/AST\_TURN\_ON\_C\_TDP'.

23. Execute the ground script.

- a. Click on the "Resume" button to invoke the execution of the ground script.
- b. Verify G/S Status is "Active".
- c. Click 'GO' to pass the WAIT command.
- d. Click 'Send' to transmit the Real-Time Command.
- e. Click 'Send' to transmit the Command PROC.

24. Verify via event display that each command was transmitted.

**FOT Planner/Scheduler -- Table Load Generation Subprocedures:**

**USER STATION #3**

25. Initiate the Table Load Builder Tool.

- a. Enter the tool directive from control window. Click the Tools button in the Control Window. Select the Table\_Load\_Builder.
- b. Verify the Table Load Builder window pops up.

26. Select a Table Template.

- a. Under "File" option select "New".
- b. Verify the Table Template Selector window appears.
- c. Select the Spacecraft id (note: system will default to AM1).
- d. Select subsystem.
- e. Highlight and click on Table Template "ESA\_OFFSET\_TBL".
- f. Verify selected Table appears in the "Selected Table Template" box.
- g. Click the "OK" button.
- h. Verify the Table Template Selector window closes.

- i. Confirm the Table Load builder displays the corresponding table information: spacecraft ID, subsystem, table type, and the default data field parameter values.

27. Define table load contents (use the default values provided).

- a. Enter valid parameter values in the data field of the pre-defined table template.
- b. Enter the uplink start time (optional) using the 'Select Time' function.

**>YYYY/DDD       :HH:MM:SS.mmm**

- c. Enter the uplink stop time (optional).

**>YYYY/DDD       :HH:MM:SS.mmm**

- d. Change the table name to 'INT\_TABLE'.

28. Generate a table load.

- a. If not already done, bring up the event display.
- b. Select "Generate" from File menu to execute load generation.
- c. Select Quit from the File pull-down menu.
- d. Verify message(s) in the status line window indicating load validation and generation was successfully completed. (note: software is designed to validate prior to generation).
- e. Verify an event message is generated indicating successful load catalog generation for INT\_TABLE.

29. Verify the uplink load and an image load files were created.

- a. open a terminal window and enter the CMS directory

**% cd /fos/test/am1/loadcatalog/working**

30. Verify an uplink load and image load reports are generated.

- a. Open a terminal window.

**% cd /fos/test/am1/loadcontents**

- b. View the report associated with the generated table load, verify the following items are included: (where applicable):

Load name	Starting and ending memory location
Load type	Contents of the load in hex, and
Valid uplink period	
Load size in bytes	